CLAIMS

1 – A method of estimating precipitation characteristics and in particular precipitation rate for solid precipitation, said method comprising an acquisition step consisting in acquiring a radar image including at least a vertical plane of a precipitation zone, and in processing a vertical profile so as to deliver digital signals representative of reflectivity in the vertical direction z, said method being characterized in that it further comprises an integration step consisting in integrating said signals representative of reflectivity through the assimilation of the reflectivity vertical profile in an aggregation model so as to deliver a signal representative of the profile in the vertical plane of the mean particle diameter weighted by the mass of each particle, and a determination step consisting in determining the concentration of the solid particles on the basis of the signals computed in the preceding steps.

2 – A method according to claim 1, characterized in that the integration step consists in determining the variable Z(h) of the radar observable in mm^6/m^3 as a function of the altitude h on the basis of said radar image, and in determining said mean diameter Dm(h) of the particles by resolving the following equation:

$$\frac{\partial D_m}{\partial h} = -0.25 k_{eff} a D_m^{b-5} 10^{-18} Z + \left(\frac{1}{6} \frac{1}{Z} \frac{\partial Z}{\partial h} \right) D_m \qquad (2)$$

where:

Z is the radar observable to be inverted in $mm^6 m^{-3}$;

D_m is in meters (m);

a and *b* are coefficients specific to particles of the "aggregate" type;

k_{eff} is the coefficient of effectiveness of the aggregation process to be adjusted.

3 – A method according to claim 2, characterized in that the coefficient k_{eff} is equal to 0.3.

4 – A method according to claim 2 to 3, characterized in that the coefficient a is equal to 35184.

5 – A method according to claim 2, 3, or 4, characterized in that the coefficient b is equal to 3.16.

6 – A method according to any one of claims 2 to 4, characterized in that said integration constant is determined so that the value $D_m(h)$ at the top of the cloud corresponds to the predetermined value for the total number of particles at the top of the cloud.

7 – A method according to any preceding claim, characterized in that the profile of the total number of particles $n_t(h)$ is determined by the following equation:

$$n_T(h)=x.Z(h)/D_m(h)^6$$

8 – A method according to any preceding claim, characterized in that x is equal to 25.4 10^{-18}.

9 – A method according to any preceding claim, characterized in that the meteorological parameter $N_0(h)$ is determined by the following equation:

$$N_0(h)=y.Z(h)/D_m(h)^7$$

10 – A method according to any preceding claim, characterized in that y is equal to 102 10^{-18}.

11 – A method according to any preceding claim, characterized in that the meteorological parameter corresponding to the profile of the ice water content *IWC(h)* (in g/m^3] is determined by the following equation:

$$IWC(h)=wZ(h)/D_m(h)^3$$

12 – A method according to the preceding claim characterized in that w is equal to 1.25 10^{-12}.

13 – A profile according to any preceding claim, characterized in that the meteorological parameter corresponding to the profile of the solid precipitation rate R(h) (mm/h equivalent melted) is determined by the following equation:

$$R(h)=r.Z(h)/D_m(h)^{2.35}$$

14 – A method according to any preceding claim, characterized in that r is equal to 4.698 10^{-10}.